Prepared from PCRM PTO-1390

Transmittal Letter to the United States Designated/Elected Office (DO/EO/US)

RECEIVED PCT/PTO 13 FEB 2002

Customer No.	026418	
Attorney's Docket No.:	GK-BUE-103 / 500647.20004	
U.S. Application No.:	10/049549	
International Application No.:	PCT/CH00/00317	
International Filing Date:	JUNE 09, 2000	09 JUNE 2000
Priority Date Claimed:	AUGUST 18, 1999	18 AUGUST 1999
Title of Invention:	PROCEDURE AND DEVICES FOR MANUFACTURING CRYSTALLIZABLE PLASTIC MATERIAL	
Applicant(s) for (DO/EO/US):	Camille BORER; Martin MUELLER and Frank GLOECKNER	

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

[X] 1. This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
[ ] 2. This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
[ ] 3. This express request to begin national examination procedures [35 U.S.C. 371 (f)] at any time rather than delay examination until the expiration of the applicable time limit set forth in 35 U.S.C. 371(b) and PCT Articles 22 and
[ ] 4. A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
[X] 5. A copy of **Publication No. WO 01/12698 published 22FEB01** ~~the International Application as filed~~ [35 U.S.C. 371(c)(2)]
   a) __ is transmitted herewith (required only if not transmitted by the International Bureau)
   b) __ has been transmitted by the International Bureau
   c) __ is not required, as the application was filed in the United States Receiving Office (RO/US)
[X] 6. A translation of **Publication No. WO 01/12698 published 22FEB01** ~~the International Application~~ into English [35 U.S.C. 371(c)(2)]
[ ] 7. Amendments to the claims of the International Application under PCT Article 19 [35 U.S.C. 371(c)(3)]
   a) __ are transmitted herewith (required only if not transmitted by the International Bureau)
   b) __ have been transmitted by the International Bureau
   c) __ have not been made; however, the time limit for making such amendments has **NOT** expired.
   d) __ have not been made and will not be made
[ ] 8. A translation of the amendments to the claims under PCT Article 19 [35 U.S.C. 371(c)(3)]
[X] 9. An UNSIGNED Oath or declaration of the inventor(s) [35 U.S.C. 371(c)(4)] ***EXECUTED Decl/POA - TO FOLLOW***
[X] 10. A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 [35 U.S.C. 371(c)(5)] (Amended sheets and claims 1 - 8)

Items 11. to 16. Below concern other document(s) or information included:

[ ] 11. An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98
[ ] 12. An Assignment document for recording. A separate cover sheet (PTO-1619A) in compliance with 37 CFR 3.28 and 3.31 is included.
[ ] 13. __ A **FIRST** preliminary amendment
   __ A **SECOND** or **SUBSEQUENT** preliminary amendment
[ ] 14. A substitute specification
[ ] 15. A change of power of attorney and/or address letter
[X] 16. (other items or information) **PCT/IB/301 10JUL00; PCT/IB/308 22FEB01; PCT/IPEA/416* and PCT/IPEA/409* 28DEC01** (*in the German language)

EXPRESS MAIL No.: **EL 915 669 825 US** Deposited: **February 13, 2002**
I hereby certify that this correspondence is being deposited with the United States Postal Service Express mail under 37 CFR 1.10 on the date indicated above and is addressed to: BOX PCT, Commissioner for Patents, Washington, DC 20231.

/Ruth Montalvo/ Date: **February 13, 2002**

10/049549

U.S. Application No. (if known, see 37 C.F.R. 1.50):
International Application No.: **PCT/CH00/00317**

JC12 Rec'd PCT/PTO 13 FEB 2002

Attorney's Docket No: GK-BUS-103 / 500647.20004

	CALCULATIONS	PTO USE ONLY
[X] 17. The following fees are submitted: BASIC NATIONAL FEE [37 CFR 1.492(a)(1)-(5)]		
[X] Search Report has been prepared by the EPO or JPO..... $ 890.00		
[ ] International preliminary examination fee paid to USPTO [37 CFR 1.482]..... $ 710.00		
[ ] No International preliminary examination fee paid to USPTO [37 CFR 1.482] but International search fee paid to USPTO [37 CFR 1.445(a)(2)]..... $ 740.00		
[ ] Neither International preliminary examination fee [37 CFR 1.482] nor International search fee [37 CFR 1.445(a)(2)] paid to USPTO..... $ 1,040.00		
[ ], International preliminary examination fee paid to USPTO [37 CFR 1.482] and all claims satisfied provisions of PCT Article 33(1)-(4)..... $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT:	**$890.00**	

Claims	Number Filed		Number Extra	Rate		
Total Claims (Article 36)	**9(8)**	-20		x $ 18. =		
Indep. Claims	**2**	-03		x $ 84. =		
[x] Multiple Dependent Claim(s) (if applicable)				+ $ 280. =	**$280.00**	
				TOTAL OF ABOVE CALCULATIONS:	**$1,170.00**	
Surcharge of $130.00 for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date [37 CFR 1.492(e)]						
				TOTAL OF ABOVE CALCULATIONS:	**$1,170.00**	
Applicant claims Small Entity Status [See 37 CFR 1.27] Reduction by ½ for filing by small entity						
				SUBTOTAL:	**$1,170.00**	
Processing fee of $130.00 for furnishing the English Translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date [37 CFR 1.492(f)]						
				TOTAL NATIONAL FEE:	**$1,170.00**	
Fee for recording the enclosed assignment [37 CFR 1.21(h)] The assignment must be accompanied by an appropriate cover sheet (PTO-1595) [37 CFR 3.28, 3.31].$ 40.00 per property +						
				TOTAL FEE(S):	**$1,170.00**	
				AMOUNTS TO BE REFUNDED OR CHARGED	**REFUNDED** $ **CHARGED** $	

(Please note the filing fee is based on the amended claims in PCT/IPEA/409 Amendment pages)

[X] Check in the amount of **$ 1,170.00** to cover the above fees is enclosed. (The Commissioner is hereby authorized to charge any additional fees required with this submission or to credit any overpayment to Deposit Account No: 50-1529.)

NOTE: Where an appropriate time limit under 36 CFR 1.494 or 1.495 has not been met, a petition to revive [37 CFR 1.137(a) or (b)] must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Gerald h. Kiel, Esq. **(Customer No. 026418)**
Reed Smith LLP
375 Park Avenue
New York, NY 10152

Gerald H. Kiel — Signature — 25,116 Reg. No. — February 13, 2002 Date

Name (Tel. (212) 521-5400)

EXPRESS MAILING CERTIFICATE

EXPRESS MAIL No.: EV049319231 Deposited: **March 21, 2002**

I hereby certify that this correspondence is being deposited with the United States Postal Service Express mail under 37 CFR 1.10 on the date indicated above and is addressed to: Commissioner for Patents, Washington, D.C. 20231.

Ruth Montalvo

GK-BUE-103/500647.20004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Camile BORER et al.	Group:	Unassigned
Serial No.:	10/049,549	Examiner:	Unassigned
Filing Date:	February 13, 2002	Customer No.:	026418
For:	PROCEDURE AND DEVICES FOR MANUFACTURING CRYSTALLIZABLE PLASTIC MATERIAL		

Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Prior to examination of the above-identified application on the merits, please amend the above-identified application as follows:

IN THE DRAWINGS:

Please delete the figure originally submitted in this application and substitute therefor the attached corrected Figure 1.

IN THE SPECIFICATION:

Please delete the specification and substitute therefor the attached substitute specification.

IN THE CLAIMS:

Before Claim 1, please delete "CLAIMS" and substitute therefor --WHAT IS CLAIMED IS:--.

Please cancel Claims 1-8 and substitute therefor the following new Claims 9-27.

--9. (New) A process for manufacturing crystallizable plastic material comprising:

(a) melting amorphous plastic material;

(b) pelletizing the plastic material;

(c) crystallizing the plastic material; and

(d) post-condensing the plastic material;

wherein the plastic material is not subjected to heating prior to the crystallization step and the plastic material is subjected to sieving after the crystallization step.--

--10. (New) The process according to Claim 9, wherein the plastic material is a polyester.--

--11. (New) The process according to Claim 10, wherein the polyester is polyethylene terephthalate.--

--12. (New) The process according to Claim 9, wherein the crystallization step takes place at a temperature of 140 °C to 180 °C.--

--13. (New) A device for manufacturing crystallizable plastic material for executing a process according to Claim 9, the device comprising a pelletizer, a fluidized bed (4) and a shaft reactor (7), wherein a sieve (5) is placed downstream from the fluidized bed (4).--

--14. (New) The device according to Claim 13, wherein the plastic material is a polyester.--

--15. (New) The device according to Claim 14, wherein the polyester is polyethylene terephthalate.--

--16. (New) A process for manufacturing crystallizable plastic material comprising:

(a) melting amorphous plastic material;

(b) crystallizing the plastic material;

(c) pelletizing the plastic material; and

(d) post-condensing the plastic material;

wherein the plastic material is not warmed again prior to the crystallization step and the plastic material is subjected to sieving after the pelletization step at roughly the same temperature as during the crystallization step and the pelletization step.--

--17. (New) The process according to Claim 16, wherein the temperature during the crystallization step, the pelletization step and the sieving step is between 100 °C and 200 °C.

--18. (New) The process according to Claim 16, wherein the temperature during the crystallization step, the pelletization step and the sieving step is between 120 °C and 160 °C.--

--19. (New) The process according to Claim 16, wherein retention time during the crystallization step is approximately 1 to 40 seconds. --

--20. (New) The process according to Claim 16, wherein retention time during the crystallization step is approximately 2 to 20 seconds.--

--21. (New) The process according to Claim 16, wherein the sieving step is followed by a second crystallization step.--

--22. (New) The process according to Claim 16, wherein the plastic material is a polyester.--

--23. (New) The process according to Claim 22, wherein the polyester is polyethylene terephthalate.--

--24. (New) A device for manufacturing crystallizable plastic material, for executing a process according to Claim 16, comprising a first crystallizer and a downstream cutter (2), wherein a sieve (5) is placed downstream from the cutter (2).--

--25. (New) The device according to Claim 24, wherein a second crystallizer is placed downstream from the sieve (5).--

--26. (New) The device according to Claim 24, wherein the plastic material is a polyester.--

--27. (New) The device according to Claim 26, wherein the polyester is polyethylene terephthalate.--

REMARKS

As a result of the foregoing amendment, Claims 1-8 have been cancelled and Claims 9-27 have been added. Accordingly, Claims 9-27 are pending in this application.

Applicants have hereinabove amended the drawings to delete the originally filed figure and substitute therefor a corrected figure (Figure 1). No new matter has been added in Figure 1.

Applicants have also hereinabove amended the specification to more particularly describe the prior art, to add section headings, to add a brief description of the figure and to correct spelling and/or grammatical errors. Further, as several amendments have been made to the specification, Applicants have submitted herewith a substitute specification. Applicants have also attached herewith a copy of the specification as it existed prior to this Preliminary Amendment with the changes made in the substitute specification

shown with brackets and underlines. No new matter has been added in the substitute specification.

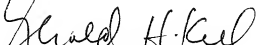
As stated above, Applicants have hereinabove amended the claims to delete Claims 1-8 and substitute therefor new Claims 9-27. In particular, Applicants have substituted the new claims for the original claims to provide antecedent basis for several terms and to conform the claims to U.S. patent practice. Applicants have enclosed a fee calculation sheet for the claims which shows that no fee is due. Claims 9-27 are fully supported by the original specification and claims. No new matter has been added in the new claims.

In view of the foregoing, it is submitted that this application is now in condition for examination on the merits and prompt notice of allowance is earnestly solicited.

Respectfully submitted,

REED SMITH, LLP

March 21, 2002

By: 

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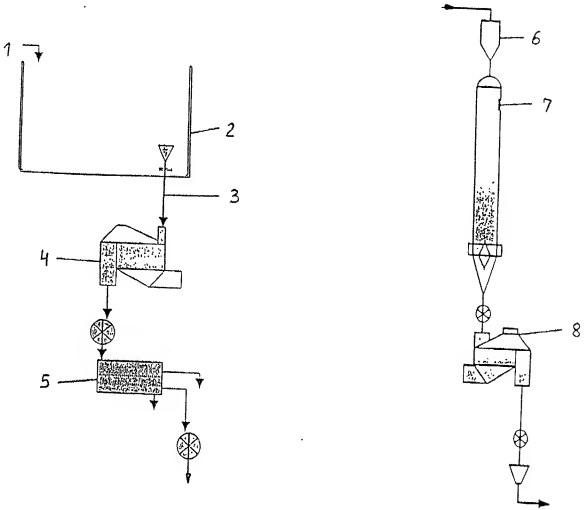

FIGURE 1

WO 01/12698
PCT/CH00/00317

Procedure and Device for Manufacturing Crystallizable Plastic Material

The invention relates to a procedure for manufacturing crystallizable plastic material, such as polyesters and the like, in particular PET, by having the melting phase be followed by crystallization and solid-state post-condensation phase, as well as to a device for executing the procedure.

Crystallization and solid-state post-condensation (SSP) of polyesters obtained from a melt, in particular PET (polyethylene terephthalate), is generally known). In this case, the meltable polyester (melting point 270 °C and above) is processed into cylindrical pellets while simultaneously cooled down to room temperature, and serves as an amorphous parent material for subsequent crystallization and post-condensation to PET. According to EP-A-379684, crystallization takes place in two fluidized beds (combination of solids-air bed and boiling bed) at temperatures of 140 °C to 180 °C. Crystallization is followed by exposure to impact to dissolve agglomerates.

However, crystallizing at a temperature of less than 140 °C already and also executing solid-state post-condensation at a temperature exceeding 180 °C is also known (e.g., according to CH 02131/92-2, which was not published as prior art).

EP-A-822214 describes a procedure in which polyester material is extruded, pelleted and crystallized without cooling the melt to a temperature far below the crystallization point. In this case, a temperature of

... a conventional SSP process for 24 hours at approx. 205 °C. According to the instruction of US-A-5510454, the temperature of the plate onto which the drops fall can also measure 180 °C.

Also known is a procedure for the simultaneous drying and crystallization of thermoplastics, e.g., PET according to WO94/25239, wherein plastic filaments to be dried are quenched for at most 1.5 seconds to achieve a surface temperature of at least 100 °C. As a result of this only partial cooling of the plastic, the crystallization period is to measure at most 20 seconds.

In a device for manufacturing polyamides according to DE-A-19510698, a moving-bed reactor can be evacuated, wherein an evacuation pump can be provided with a separator for separating dust out of the waste gas. However, solid foreign substances, dusts and the like are not reliably removed from the plastic material.

US-3405098 describes a procedure for preparing linear condensation polyesters for solid phase polymerization, wherein the melt is quickly quenched in order to obtain an essentially amorphous, solid polyester, which is subsequently heated to 150 °C to 200 °C again, in order to obtain a partially crystallized polyester, which is subsequently milled into fine particles, and classified using sieves. The polyester prepared in this away is then subjected to solid-phase polymerization in a fluidized bed.

The object of the invention is to further develop a procedure for manufacturing crystallizable plastic material, like polyester or PET, in such a way as to achieve a higher reactivity in the SSP process as the result of larger crystals and an improved surface

crystal structure, and to reliably separate solid foreign substances form the plastic material after crystallization. Power consumption is to be reduced as well. This is done based on the features in claims 1 or 3.

The object of the invention is also to provide a suitable device for executing the above procedure.

The subclaims contain preferred embodiments.

The invention shall be described in greater detail below in an embodiment based on a drawing. The sole figure in the drawing shows an elementary diagram.

PET 1 passes from a melting reactor (not shown) into a cutter 2 with a temperature of approx. 280 °C while being cooled and solidified.

The amorphous pellets 3 with a temperature of 140 °C to 180 °C produced in this way then pass to a fluidized bed 4 without any further cooling for a retention time typical for the procedure, and then to a sieve 5, which can also have a downstream ambient air sifter to separate out dust and other foreign solids.

According to EP-A-379684, the fluidized bed 2 can also resemble a combination of spouted bed and boiling bed. If needed, additional crystallization can follow the sieving process (not shown).

The PET cleaned and crystallized in this way passes in the usual manner into a preheater 6, or directly into a shaft reactor 7, where the solid phase recondensation into PET takes place, and only thereafter is the granulate cooled to room temperature in a cooler 8.

CLAIMS

1. A procedure for manufacturing crystallizable plastic material, such as polyesters, e.g., PET, by melting on amorphous plastic material, which is subsequently granulated, crystallized and recondensed, wherein the plastic material need not be heated before crystallization, characterized in that the plastic material is subjected to a sieving process after crystallization, and that crystallization takes place at a temperature of 140 °C to 180 °C.

2. A device for manufacturing crystallizable plastic material, such as polyester, e.g., PET, for executing a procedure according to claim 1, comprising a granulating device, a fluidized bed (4) and a shaft reactor (7), characterized in that a sieve (5) is placed downstream from the fluidized bed (4).

3. A procedure for manufacturing crystallizable plastic material, such as polyester, e.g., PET, by melting amorphous plastic material, which is subsequently crystallized, granulated and recondensed, wherein the plastic material need not be heated again before crystallization, characterized by the fact that, after granulation, the plastic material is subjected to a sieving process at about the same temperature as during crystallization and granulation.

4. The procedure according to claim 3, characterized in that the temperature during crystallization, granulation and sieving measures 100 °C to 200 °C, preferably 120 °C to 160 °C.

5. The procedure according to one of claims 3 or 4, characterized in that the retention time during crystallization measures approx. 1 to 40 seconds, preferably 2 to 20 seconds.

6. The procedure according to claim 5, characterized in that the sieving process is followed by further crystallization.

7. A device for manufacturing crystallizable plastic material, such as polyester, e.g., PET, for executing a procedure according to claim 3, with a crystallizer followed by a cutter (2), characterized in that a sieve (5) is placed downstream from the cutter (2).

8. The device according to claim 7, characterized in that another crystallizer is placed downstream from the sieve (5).

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro

(43) Internationales Veröffentlichungsdatum
22. Februar 2001 (22.02.2001)

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(25) Einreichungssprache: Deutsch

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(30) Angaben zur Priorität:
199 38 583.1 18. August 1999 (18.08.1999) DE

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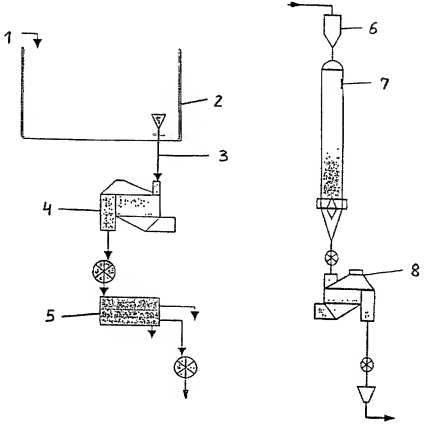
(74) Gemeinsamer Vertreter: **BÜHLER AG**; Bühler AG, Patentabteilung, CH-9240 Uzwil (CH).

[Fortsetzung auf der nächsten Seite]

(54) Title: METHOD AND DEVICE FOR PRODUCING CRYSTALLISABLE PLASTIC MATERIAL

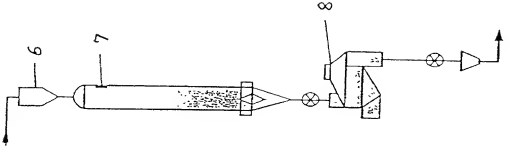
(54) Bezeichnung: VERFAHREN UND VORRICHTUNG ZUR HERSTELLUNG VON KRISTALLISATIONSFÄHIGEM KUNSTSTOFFMATERIAL



(57) Abstract: The invention relates to a method and a device for producing crystallisable plastic material, especially PET, by means of a conventional SSP treatment. The plastic material only cools down to the crystallisation temperature before crystallisation. After granulation and crystallisation, the plastic material is subjected to a sieving process in a temperature remaining approximately the same.

(57) Zusammenfassung: Die Erfindung betrifft ein Verfahren und eine Vorrichtung zur Herstellung von kristallisationsfähigem Kunststoffmaterial, insbesondere von PET mittels einer üblichen SSP-Behandlung, wobei das Kunststoffmaterial vor der Kristallisation nur bis auf Kristallisationstemperatur abkühlt und nach dem Granulieren und Kristallisieren bei etwa gleichbleibender Temperatur einem Siebvorgang unterzogen wird.

WO 01/12698 A1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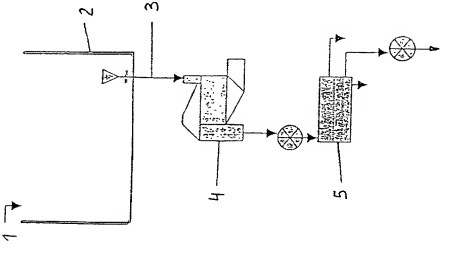
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Sub Spec

PROCEDURE AND DEVICE FOR MANUFACTURING CRYSTALLIZABLE PLASTIC MATERIAL

BACKGROUND OF THE INVENTION

The present invention relates to a procedure for manufacturing crystallizable plastic material, e.g., polyesters and the like, and in particular polyethylene terephthalate (PET), via post-melting phase crystallization and solid-phase post-condensation, and a device for executing the procedure.

The crystallization and post-condensation in the solid-phase (SSP) of polyesters obtained from a melt, in particular PET (polyethylene terephthalate), is generally known. In this case, the melted polyester (melting point 270 °C and [above] higher) is processed into cylindrical pellets, for example, while simultaneously cooled down to room temperature, and serves as an amorphous starting material for subsequent crystallization and post-condensation to PET. According to EP-A-379684, for example, crystallization takes place in two fluidized beds (combination of boiling and spouting beds) at temperatures of 140 °C to 180 °C. Crystallization is followed by exposure to impact to dissolve agglomerates.

However, it is also known that crystallization can take place at a temperature of less than 140 °C and solid-state post-condensation can take place at a temperature exceeding 180 °C (e.g., according to the unpublished CH 02131/92-2).

EP-A-822214 describes a procedure in which a polymer material is extruded, pelleted and crystallized without cooling the melt to a temperature far below the crystallization temperature. In this case, a temperature of approx. 160 °C to 220 °C is maintained, and crystallization takes approx. 5 - 30 minutes. However, WO 97/23543 discloses this omission of strong cooling off during pelleting. Polyester is kept in a melt at approx. 270 °C, and drips through a hole onto a hot (approx. 135 °C) metal plate, where crystallization has already taken place. A conventional SSP process then follows this for 24 hours at approx. 205 °C. According to U.S. Patent No. 5,510,454, the temperature of the plate that receives the drops can also measure 180 °C.

Also known is a procedure for the simultaneous drying and crystallization of thermoplastics, e.g., PET according to WO94/25239, wherein plastic strands to be dried are quenched for at most 1.5 seconds to achieve a surface temperature of at least 100 °C. This partial cooling of the

plastic only reduces the crystallization time down to approx. 20 seconds at most.

In a device for manufacturing polyamides according to DE-A-19510698, a moving-bed reactor can be evacuated, wherein a vacuum pump can be provided with a separator for separating dust from the waste gas. However, solid foreign substances, dusts and the like are not reliably removed from the plastic material.

Further, U.S. Patent No. 3,405,098 describes a procedure for preparing linear condensation polyesters for solid phase polymerization, wherein the melt is quickly quenched in order to obtain an essentially amorphous, solid polyester, which is subsequently heated to 150 °C to 200 °C again, in order to obtain a partially crystallized polyester, which is subsequently milled into fine particles, and classified using sieves. The polyester prepared in this way is then subjected to solid-phase polymerization in a fluidized bed.

SUMMARY OF THE INVENTION

One of the objects of the present invention is to further develop a procedure for manufacturing crystallizable plastic material, such as polyester or PET, in such a way as

to achieve a higher reactivity in the SSP process through larger crystallites and improved surface crystal structure, and to reliably separate solid foreign substances from the plastic material after crystallization.

Another object of the present invention is to lower power consumption. This is accomplished based upon the features described in the claims.

Another object of the present invention is to provide a suitable device for executing the above procedure.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a schematic view of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Preferred embodiments of the present invention are described in the claims.

The present invention shall be described in greater detail based upon the embodiment shown in Figure 1. Figure 1 shows a schematic view of the embodiment.

In particular, PET 1 exits a melt reactor (not shown) and enters a cutter 2 at a temperature of approx. 280 °C while being cooled and solidified.

The amorphous pellets 3 having a temperature of 140 °C to 180 °C generated in this way then pass to a fluidized bed 4 without further cooling, and subsequently to a sieve 5, which can be followed by a recirculating air sifter if required, in order to separate out dust and other foreign solids.

According to EP-A-379684, the fluidized bed 2 can also be a combination of boiling and spouted beds. If need be, the sieving process is followed by more crystallization (not shown).

The PET cleaned and crystallized passes in a conventional manner to a preheater 6 or directly to a shaft reactor 7, where the solid phase post-condensation into PET takes place, and only thereafter are the pellets cooled to room temperature in a cooler 8.

Marked-up Spec

Rec'd PCT/PTO 21 MAR 2002
10/049549

[Procedure And Device For Manufacturing Crystallizable Plastic Material]

PROCEDURE AND DEVICE FOR MANUFACTURING CRYSTALLIZABLE PLASTIC MATERIAL

BACKGROUND OF THE INVENTION

The present invention relates to a procedure for manufacturing crystallizable plastic material, [such as] e.g., polyesters and the like, and in particular [PET] polyethylene terephthalate (PET), [by having the melting] via post-melting phase [be followed by] crystallization and [solid-state] solid-phase post-condensation [phase, as well as to] , and a device for executing the procedure.

[Crystallization] The crystallization and [solid-state] post-condensation in the solid-phase (SSP) of polyesters obtained from a melt, in particular PET (polyethylene terephthalate), is generally known[)]. In this case, the [meltable] melted polyester (melting point 270 °C and [above] higher) is processed into cylindrical pellets, for example, while simultaneously cooled down to room temperature, and serves as an amorphous [parent] starting material for subsequent crystallization and post-condensation to PET. According to EP-A-379684, for example, crystallization takes place in two fluidized beds (combination of [solids-air bed and] boiling [bed] and spouting beds) at temperatures of 140 °C to 180 °C. Crystallization is followed by exposure to impact to dissolve agglomerates.

However, [crystallizing] it is also known that crystallization can take place at a temperature of less than 140 °C [already] and [also executing] solid-state post-condensation can take place at a temperature exceeding 180 °C [is also known] (e.g.,

according to the unpublished CH 02131/92-2[, which was not published as prior art]).

EP-A-822214 describes a procedure in which [polyester] a polymer material is extruded, pelleted and crystallized without cooling the melt to a temperature far below the crystallization [point] temperature. In this case, a temperature of approx. 160 °C to 220 °C is maintained, and crystallization [is to take] takes approx. 5 - 30 minutes. However, WO 97/23543 [already disclosed] discloses this [process] omission of strong cooling off during pelleting. Polyester is [held] kept in a melt at approx. 270 °C, and drips through [an opening] a hole onto a [metal plate heated to] hot (approx. 135 °C) metal plate, where crystallization has already [takes] taken place. [This is then followed by a] A conventional SSP process then follows this for 24 hours at approx. 205 °C. According to [the instruction of US-A-5510454] U.S. Patent No. 5,510,454, the temperature of the plate [onto which the drops fall] that receives the drops can also measure 180 °C.

Also known is a procedure for the simultaneous drying and crystallization of thermoplastics, e.g., PET according to WO94/25239, wherein plastic [filaments] strands to be dried are quenched for at most 1.5 seconds to achieve a surface temperature of at least 100 °C. [As a result of this only] This partial cooling of the plastic[,] only reduces the crystallization [period is to measure at most] time down to approx. 20 seconds at most.

In a device for manufacturing polyamides according to DE-A-19510698, a moving-bed reactor can be evacuated, wherein [an evacuation] a vacuum pump can be provided with a separator for separating dust [out of] from the waste gas. However, solid

foreign substances, dusts and the like are not reliably removed from the plastic material.

[US-3405098] Further, U.S. Patent No. 3,405,098 describes a procedure for preparing linear condensation polyesters for solid phase polymerization, wherein the melt is quickly quenched in order to obtain an essentially amorphous, solid polyester, which is subsequently heated to 150 °C to 200 °C again, in order to obtain a partially crystallized polyester, which is subsequently milled into fine particles, and classified using sieves. The polyester prepared in this [away] way is then subjected to solid-phase polymerization in a fluidized bed.

SUMMARY OF THE INVENTION

[The object] One of the objects of the present invention is to further develop a procedure for manufacturing crystallizable plastic material, [like] such as polyester or PET, in such a way as to achieve a higher reactivity in the SSP process [as the result of] through larger [crystals] crystallites and [an] improved surface crystal structure, and to reliably separate solid foreign substances [form] from the plastic material after crystallization. [Power consumption is to be reduced as well. This is done based on the features in claims 1 or 3.]

Another object of the present invention is to lower power consumption. This is accomplished based upon the features described in the claims.

[The] Another object of the present invention is [also] to provide a suitable device for executing the above procedure.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a schematic view of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[The subclaims contain preferred] Preferred embodiments of the present invention are described in the claims.

The present invention shall be described in greater detail [below in an embodiment based on a drawing] based upon the embodiment shown in Figure 1. [The sole figure in the drawing shows an elementary diagram.] Figure 1 shows a schematic view of the embodiment.

In particular, PET 1 [passes from] exits a [melting] melt reactor (not shown) [into] and enters a cutter 2 [with] at a temperature of approx. 280 °C while being cooled and solidified.

The amorphous pellets 3 [with] having a temperature of 140 °C to 180 °C [produced] generated in this way then pass to a fluidized bed 4 without [any] further cooling [for a retention time typical for the procedure], and [then] subsequently to a sieve 5, which can [also have a downstream ambient] be followed by a recirculating air sifter if required, in order to separate out dust and other foreign solids.

According to EP-A-379684, the fluidized bed 2 can also [resemble] be a combination of [spouted bed and boiling bed] boiling and spouted beds. If [needed] need be, [additional

crystallization can follow] the sieving process is followed by more crystallization (not shown).

The PET cleaned and crystallized passes in [this way passes in the usual] a conventional manner [into] to a preheater 6[,] or directly [into] to a shaft reactor 7, where the solid phase [recondensation] post-condensation into PET takes place, and only thereafter [is the granulate] are the pellets cooled to room temperature in a cooler 8.

UNITED STATES OF AMERICA
COMBINED DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION

FILE NO. GK-BUE-103/ 500647.20004

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that I verily believe that I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PROCEDURE AND DEVICE FOR MANUFACTURING CRYSTALLIZABLE PLASTIC MATERIAL

The specification of which

- ☐ is attached hereto.
- ☐ was filed on _____ as United States patent application Serial Number _____.
- ☒ was filed on June 9, 2000 as PCT international patent application No. PCT/CH00/00317 and was amended on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to be material to patentability in accordance with Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

COUNTRY	APPLICATION NUMBER	DATE OF FILING *(day, month, year)*	PRIORITY CLAIMED UNDER 35 U.S.C. § 119
Germany	199 38 583.1	18 August 1999	YES x NO ____
			YES ___ NO ____

I hereby appoint REED SMITH LLP and the members of the firm: Lloyd McAulay, Reg. No. 20,423; Jules E. Goldberg, Reg. No. 24,408; Gerald H. Kiel, Reg. No. 25,116; Eugene LeDonne, Reg. No. 35,930; Stephen Chin, Reg. No. 39,938; Arthur Dresner, Reg. No. 24,403; Daniel Lent, Reg. No. 44,867; Samir R. Patel, Reg. No. 44,998; and Harry K. Ahn, Reg. No. 40,243, as attorneys with full power of substitution and revocation to prosecute all business in the Patent & Trademark Office connected therewith and to receive all correspondence.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION (continued)		File No. GK-BUE-103/ 500647.20004
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